AMENDMENTS TO THE CLAIMS

1. (Canceled)

2. (Currently Amended) A [[The]] network node for a communications network which comprises a plurality of network nodes interconnected by communication links, wherein said network node is one of said plurality of network nodes, comprising:

a first module, having a plurality of input ports and a plurality of output ports, for handling a group of channels between said input ports and said output ports as a routing unit;

a second module, having an input port and an output port, for handling a channel between the input port and the output port as said routing unit;

a module state database for storing module cost data of said first and second modules and module cost data of other network nodes;

a link state database for storing link cost data of said communication links,

a switching system for determining a route of minimum cost by using said module state database and said link state database and establishing, according to the determined route, a connection between one of a plurality of incoming communication links and one of the input ports of said first and second modules and establishing a connection between one of the output ports of said first and second modules and one of a plurality of outgoing communication links, wherein said switching system determines said route of minimum cost by:

detecting available links along possible routes in said link state database and detecting available first and second modules in said module state database;

forming a plurality of candidate paths by using the available links and the available first and second modules;

calculating costs of said candidate paths by using said module and link state database; and

determining one of said candidate paths having a minimum value of the calculated costs as said route of minimum cost.

3. (Currently Amended) The network node of claim [[1]] 2, wherein the network node is an intermediate node between first and second network nodes, and wherein said link state database includes a first plurality of link entries for storing status of links to said first and second network nodes and a second plurality of link entries for storing status of forwarding adjacency links between said first and second network nodes, said second plurality of link entries containing a total cost of said links and said modules.

4. (Currently Amended) The network node of claim [[1]] 2, wherein said switching system is an optical switching system, and said incoming and outgoing links are optical links and said channels are wavelength channels.

5. (Original) The network node of claim 4, wherein said first module comprises an optical switch module for simultaneously establishing a plurality of connections between said plurality of input ports and said plurality of output ports for carrying a plurality of said wavelength channels and said second module comprises an optical switch module for establishing a connection at a time between said input port and said output port for carrying a wavelength channel.

6. (Original) The network node of claim 5, wherein said second module is capable of converting the wavelength of said wavelength channel to a different wavelength.

7. (Original) The network node of claim 4, wherein said first module comprises an optical regenerator module for simultaneously performing an optical regeneration process on a plurality of said wavelength channels.

8. (Original) The network node of claim 4, wherein said second module comprises an optical regenerator module for performing an optical regeneration process on a wavelength channel.

9. (Original) The network node of claim 4, wherein a plurality of wavelengths are multiplexed on each of said incoming links and each of said outgoing links, and wherein said first module simultaneously handles said multiplexed wavelengths as said routing unit and said second module selects one of the multiplexed wavelengths for handling the selected wavelength as said routing unit.

10. (Currently Amended) The network node of claim [[1]] 2, wherein the network node is an intermediate node between first and second network nodes, and wherein said link state database includes a plurality of physical link entries for storing status of links to each of said first and second network nodes and a plurality of virtual link entries for storing status of concatenated links between said first and second network nodes, said virtual link entries containing a cost of each of said virtual links.

11. (Currently Amended) The network node of claim [[1]] 2, further comprising terminating circuitry for transmitting a message to neighboring network nodes for communicating the contents of said module and link state databases and receiving a message from said neighboring network nodes for updating said module and link state databases according to the received message.

12. (Canceled)

13. (Previously Presented) The communications network comprising:

a plurality of network nodes interconnected by a plurality of incoming communication links and a plurality of outgoing communication links,

each of said network nodes comprising:

a first module, having a plurality of input ports and a plurality of output ports, for handling a group of channels between said input ports and said output ports as a routing unit;

a second module, having an input port and an output port, for handling a channel between the input port and the output port as said routing unit;

a module state database for storing module cost data of said first and second modules and module cost data of other network nodes;

a link state database for storing link cost of each of said incoming links and each of said outgoing links,

a switching system for determining a route of minimum cost by using said module state database and said link state database and establishing, according to the determined route, a connection between one of the incoming communication links and one of the input ports of said first and second modules and establishing a connection between one of the output ports of said first and second modules and one of said outgoing communication links;

terminating circuitry for transmitting a message to neighboring network nodes for communicating the contents of said module state database and receiving a message from said neighboring network nodes for updating said module state database according to the received message, wherein said switching system determines said route of minimum cost by:

detecting available links along possible routes in said link state database and detecting available first and second modules in said module state database;

forming a plurality of candidate paths by using the available links and the available first and second modules;

calculating costs of said candidate paths by using said module and link state database; and

determining one of said candidate paths having a minimum value of the calculated costs as said route of minimum cost.

14. (Currently Amended) The communications network of claim [[12]] 13, wherein said each network node is an intermediate node between first and second network nodes, and wherein said link state database includes a plurality of link entries for storing status of links to each of said first and second network nodes and a plurality of channel entries for storing status of channels between said first and second network nodes, said channel entries containing a total cost of said channels and said modules.

15. (Currently Amended) The communications network of claim [[12]] 13, wherein said switching system is an optical switching system, and said incoming and outgoing links are optical links and said channels are wavelength channels.

16. (Original) The communications network of claim 15, wherein said first module comprises an optical switch module for simultaneously establishing a plurality of connections between said plurality of input ports and said plurality of output ports for carrying a plurality of said wavelength channels and said second module comprises an optical switch module for establishing a connection at a time between said input port and said output port for carrying a wavelength channel.

17. (Original) The communications network of claim 16, wherein said second module is capable of converting the wavelength of said wavelength channel to a different wavelength.

18. (Original) The communications network of claim 16, wherein said first module comprises an optical regenerator module for simultaneously performing an optical regeneration process on a plurality of said wavelength channels.

19. (Original) The communications network of claim 16, wherein said second module comprises an optical regenerator module for performing an optical regeneration process on a wavelength channel.

20. (Original) The communications network of claim 16, wherein a plurality of wavelengths are multiplexed on each of said incoming links and each of said outgoing links, and wherein said first module simultaneously handles said multiplexed wavelengths as said routing unit and said second module selects one of the multiplexed wavelengths for handling the selected wavelength as said routing unit.

21. (Currently Amended) The communications network of claim [[12]] 13, wherein said each network node is an intermediate node between first and second network nodes, and wherein said link state database includes a first plurality of link entries for storing status of links to said first and second network nodes and a second plurality of link entries for storing status of forwarding adjacency links between said first and second network nodes, said second plurality of link entries containing a total cost of said links and said modules.

22. (Canceled)

23. (Previously Presented) The centralized network management system comprising:

a plurality of network nodes interconnected by communication links;

a management center connected to said network nodes via control channels,

each of said network nodes comprising:

a first module, having a plurality of input ports and a plurality of output ports, for handling a group of channels between said input ports and said output ports as a routing unit;

a second module, having an input port and an output port, for handling a channel between the input port and the output port as said routing unit; and

a switching fabric having a plurality of incoming interfaces for interfacing incoming links and a plurality of outgoing interfaces for interfacing outgoing links; and

said management center comprising:

a module state database;

a link state database for storing link cost of each of said incoming links and each of said outgoing links;

a path controller for storing module cost data of said first and second modules of each of said network nodes into said module state database and determining a route of minimum cost by using said module state database and said link state database and controlling said switching fabric to establish a connection between one of the incoming interfaces and one of the input ports of said first and second modules and establish a connection between one of the output ports of said first and second modules and one of said outgoing interfaces, wherein said path controller determines said route of minimum cost by:

detecting available links along possible routes in said link state database and detecting available first and second modules in said module state database;

forming a plurality of candidate paths by using the available links and the available first and second modules;

calculating costs of said candidate paths by using said module and link state database; and

determining one of said candidate paths having a minimum value of the calculated costs as said route of minimum cost.

24. (Currently Amended) The centralized network management system of claim 23 [[22]], wherein said each network node is an intermediate node between first and second network nodes, wherein said link state database includes a first plurality of link entries for storing status of links to said first and second network nodes and a second plurality of link entries for storing status of forwarding adjacency links between said first and second network nodes, said second plurality of link entries containing a total cost of said links and said modules.

25. (Currently Amended) The centralized network management system of claim [[22]] 23, wherein said switching fabric is an optical switching fabric, and said incoming and outgoing links are optical links and said channels are wavelength channels.

26. (Original) The centralized network management system of claim 25, wherein said first module comprises an optical switch module for simultaneously establishing a plurality of connections between said plurality of input ports and said plurality of output ports for carrying a plurality of said wavelength channels and said second module comprises an optical switch module for establishing a connection at a time between said input port and said output port for carrying a wavelength channel.

27. (Original) The centralized network management system of claim 26, wherein said second module is capable of converting the wavelength of said wavelength channel to a different wavelength.

28. (Original) The centralized network management system of claim 25, wherein said first module comprises an optical regenerator module for simultaneously performing an optical regeneration process on a plurality of said wavelength channels.

29. (Original) The centralized network management system of claim 26, wherein said second module comprises an optical regenerator module for performing an optical regeneration process on a wavelength channel.

30. (Original) The centralized network management system of claim 25, wherein a plurality of wavelengths are multiplexed on each of said incoming links and each of said outgoing links, and wherein said first module simultaneously handles said multiplexed wavelengths as said routing unit and said second module selects one of the multiplexed wavelengths for handling the selected wavelength as said routing unit.

31. (Currently Amended) The centralized network management system of claim [[22]] 23, wherein said each network node is an intermediate node between first and second network nodes, and wherein said link state database includes a first plurality of link entries for storing status of links to said first and second network nodes and a second plurality of link entries for storing status of forwarding adjacency links between said first and second network nodes, said second plurality of link entries containing a total cost of said links and said modules.

32. (Canceled)

33. (Previously Presented) A routing method comprising the steps of:

a) providing, in each of a plurality of network nodes interconnected by communication links, a first module having a plurality of input ports and a plurality of output ports, the first module handling a group of channels between said input ports and said output ports as a routing unit;

b) providing, in each of a plurality of network nodes, a second module having an input port and an output port, the second module handling a channel between the input port and the output port as said routing unit;

c) storing module cost data of said first and second modules of said plurality of network nodes in a module state database;

d) storing link cost of said communication links in a link state database; and

e) determining a route of minimum cost by using said module state database and said link state database, wherein the step (e) comprises the steps of:

detecting available links along possible routes in said link state database and detecting available first and second modules in said module state database;

forming a plurality of candidate paths by using the available links and the available first and second modules;

calculating costs of said candidate paths by using said module and link state database; and

determining one of said candidate paths having a minimum value of the calculated costs as said route of minimum cost.